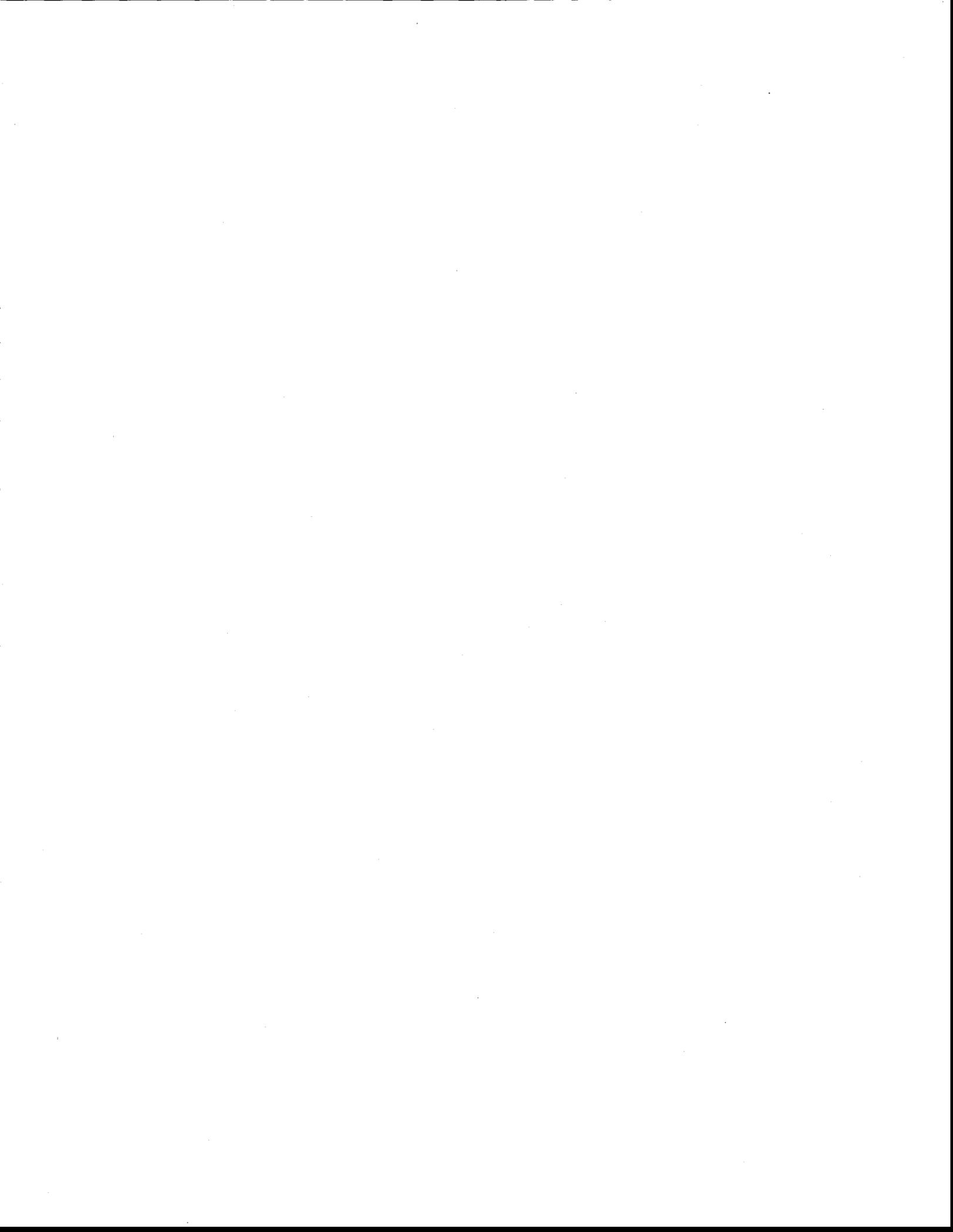


# **LEGISLATIVE COMMITTEE ON NEW LICENSING BOARDS**

Assessment Report  
for

## **Landscape Architects**

**House Bill 1110**



**LEGISLATIVE COMMITTEE ON NEW LICENSING BOARDS**

**May 27, 1997**

The Legislative Committee on New Licensing Boards is pleased to release this assessment report on the licensing of landscape architects. This report constitutes both the preliminary and final assessment reports.



Representative Frank Mitchell

  
Prepared by:

Linwood Jones, Counsel



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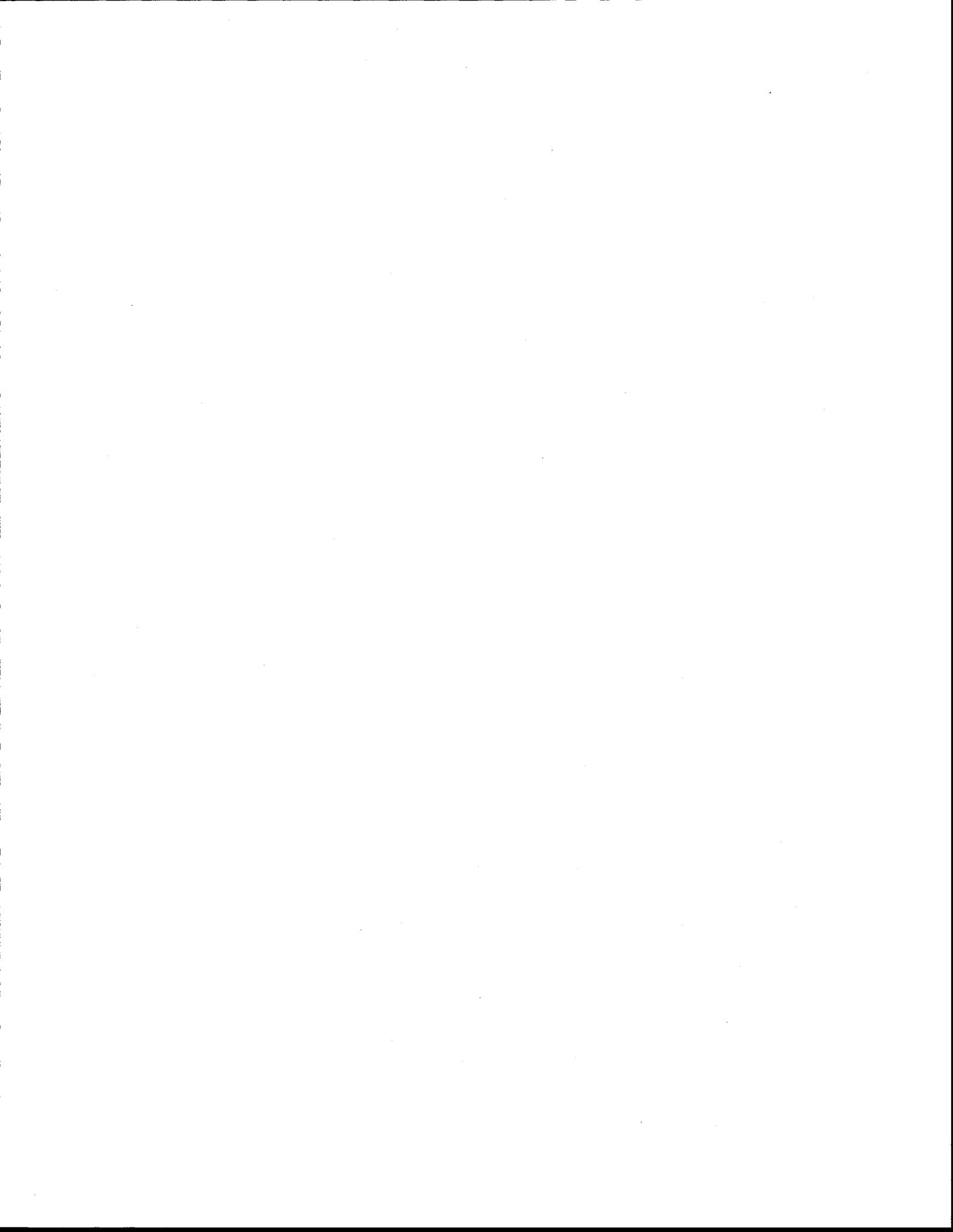
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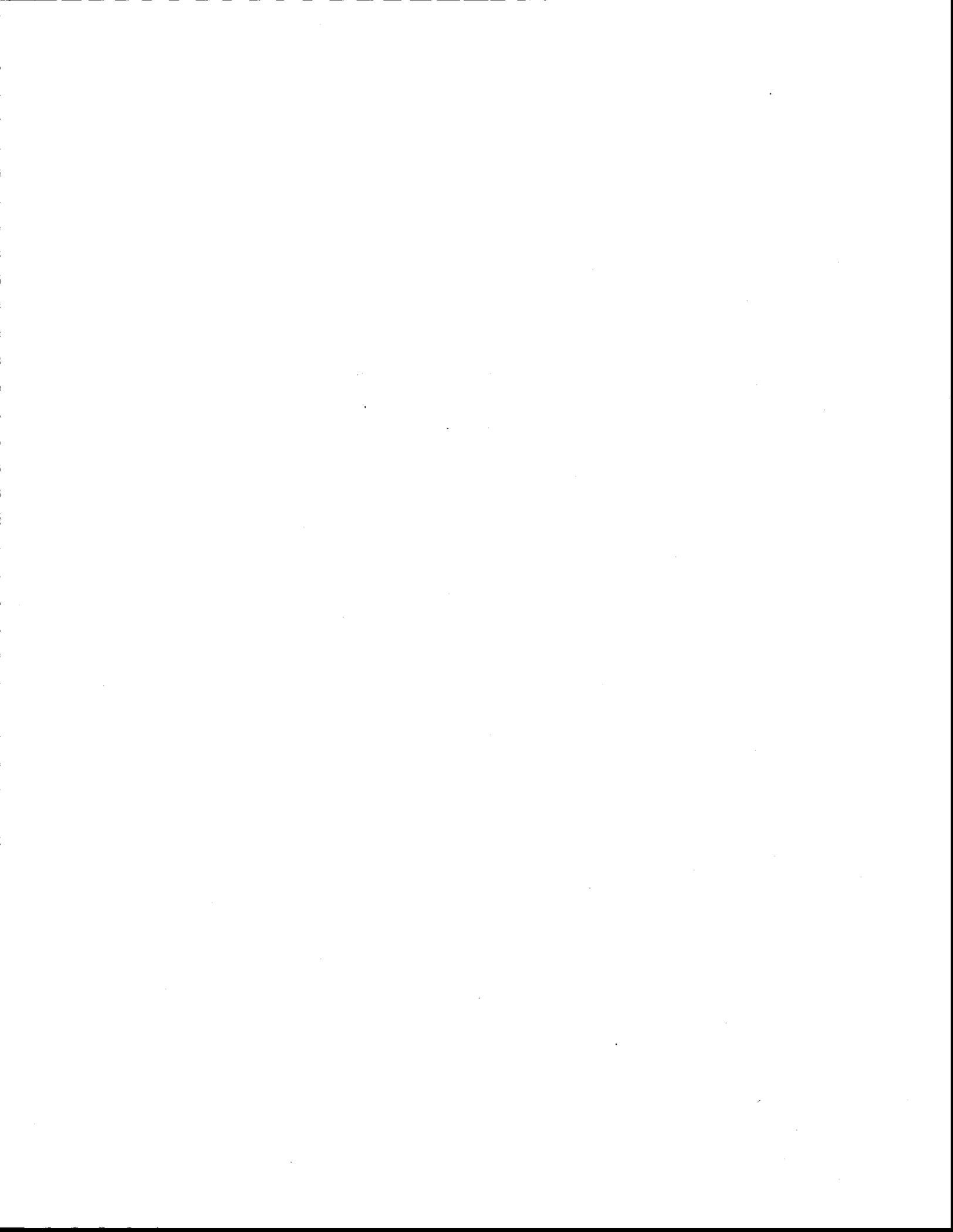
## PREFACE

The Legislative Committee on New Licensing Boards is a 9-member joint committee of the House and Senate created and governed by statute (Article 18A of Chapter 120 of the General Statutes). The primary purpose of the Committee is to evaluate the need for a new licensing board or the proposed licensing of previously unregulated practitioners by an existing board. The Committee has been in existence since 1985.

The Committee solicits written and oral testimony on each licensing proposal in carrying out its duty to determine whether the proposal meets the following criteria:

- (1) Whether the unregulated practice of the profession can substantially endanger the public health, safety, or welfare, and whether the potential for such harm is recognizable and not remote or dependent upon tenuous argument.
- (2) Whether the profession possesses qualities that distinguish it from ordinary labor.
- (3) Whether practice of the profession requires specialized skill or training.
- (4) Whether a substantial majority of the public has the knowledge or experience to evaluate the practitioner's competence.
- (5) Whether the public can effectively be protected by other means.
- (6) Whether licensure would have a substantial adverse economic impact upon consumers of the practitioner's good or services.

The Committee issues an assessment report on its findings and recommendations. The recommendation in the report is not binding on other committees considering the proposal.



## **Landscape Architects**

Landscape architects are involved in the planning and design of and supervision of projects involving the arranging of land and the elements used thereon. Since 1969, the State has had a landscape architecture "title" act – i.e., a law reserving to qualified individuals the right to use the title "landscape architect." However, the existing law does not regulate the practice of landscape architecture. A person without any qualifications can currently engage in the practice of landscape architecture as long as he or she does not call himself or herself a landscape architect.

The sponsor notes in its submission that decisions made by and work performed by landscape architecture affect not only the clients for whom the work is done but the public as well. The potential for permanent damage to the land and other natural resources is significant. For example, decisions to remove trees in an area or to excavate in certain areas are often irreversible decisions that can lead to environmental problems and the destruction of natural resources.

Nearly one-half of the states require landscape architects to be licensed. The proposed requirements for licensure under House Bill 1110 would be similar to the certification requirements currently in existence for those who voluntarily become certified under the landscape architecture title act – graduation from a collegiate curriculum in landscape architecture and three years experience (now one year) or a combined seven years of education and experience found acceptable to the Board that regulates the industry. The bill also provides for an

"emeritus" title for long-standing practitioners, but those practitioners must be licensed to actually practice in this State.

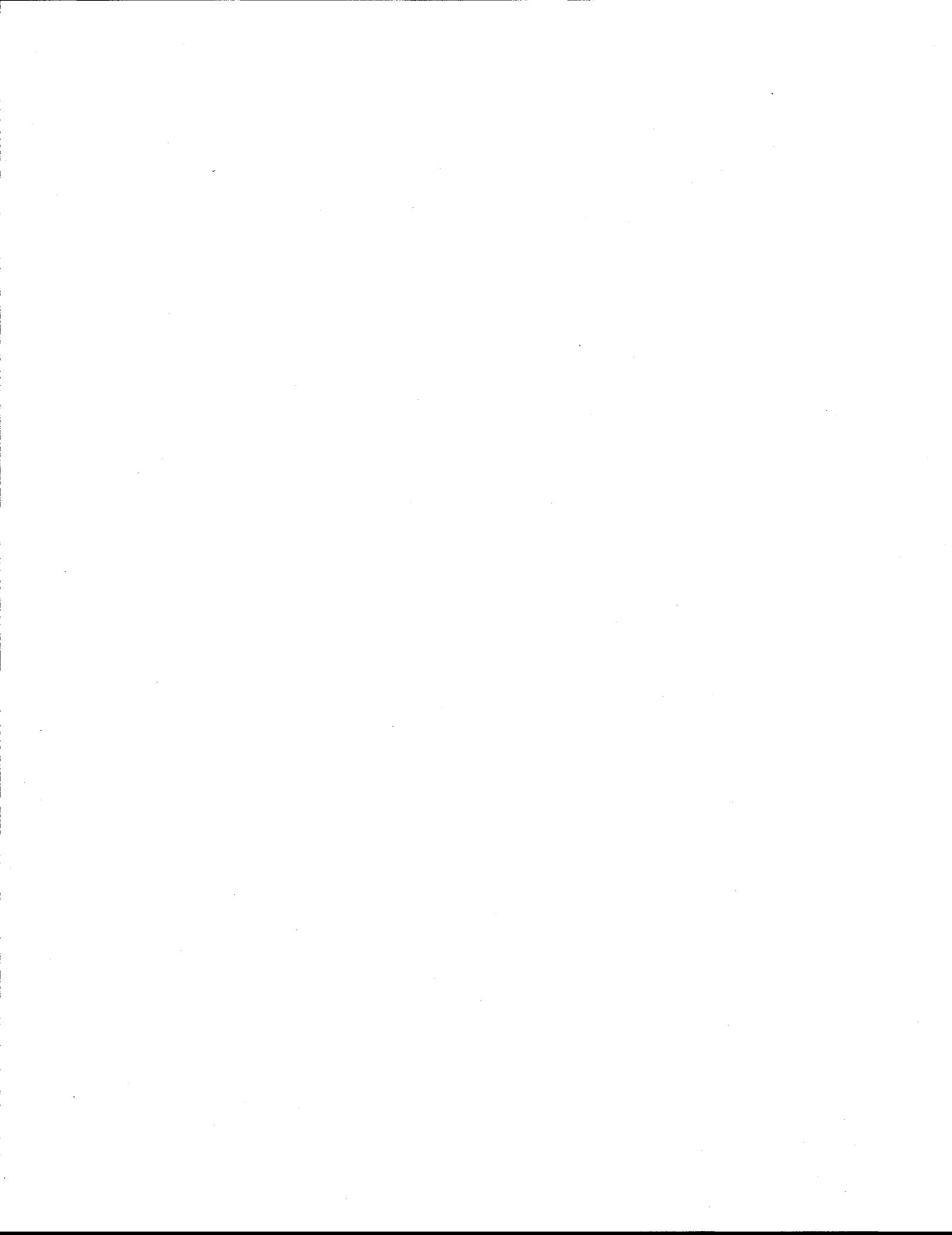
There are currently 356 licensed landscape architects who are North Carolina residents and nearly 150 nonresident landscape architects who work in North Carolina.

The Legislative Committee on New Licensing Boards finds that the sponsor has met the six statutory criteria by which the Committee judges licensure proposals, as follows:

- (1) The unregulated practice of the profession can substantially harm or endanger the public health, safety, or welfare, and the potential for such harm is recognizable and not remote nor dependent upon tenuous argument.
- (2) The practice of the profession possesses qualities that distinguish it from ordinary labor.
- (3) The practice of the profession requires specialized skill and training.
- (4) A substantial majority of the public does not have the knowledge or experience to evaluate the practitioner's competence.
- (5) The public cannot be effectively protected by other means.
- (6) Licensure would not have a substantial adverse economic impact upon consumers.

The Legislative Committee on New Licensing Boards recommends the licensing of landscape architects. This assessment report constitutes both the

preliminary and the final assessment report for the licensing of landscape architects. The report is based on the proposed licensing of landscape architects as set out in House Bill 1110, the response to the Committee's questionnaire (attached), and testimony before the Committee on May 19, 1997.



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- (1) In what ways has the marketplace failed to regulate adequately the profession or occupation?**

Landscape Architecture has been regulated in North Carolina since 1969 under a Title Act (NCGS 89A). The market place has not been a regulating factor in protecting the public during this time because Landscape Architecture was regulated under a title act and not a practice act. Those who elect not to use the title Landscape architect do not have to meet any minimal competence requirements to practice many aspects of landscape architecture. This legislation is simply to convert from an existing title statute to a title and practice statute to prevent the public from being subjected to incompetent landscape architectural services being offered under other names.

- (2) Have there been any complaints about the unregulated profession or occupation? Please give specific examples including (unless confidentiality must be maintained) complainant's names and addresses.**

No. All complaints concerning Landscape Architects have been handled in the regulated environment, with the North Carolina Board of Landscape Architects immediately responding to any allegations of dishonest practice, incompetence, or unprofessional conduct. Complaints about incompetence of non Landscape Architect practitioners would not be directed to the Landscape Architect's Board. Evidence of incompetent practice by non licensed individuals does exist in the completed works around us, such as "Sugar Top" in the Appalachian mountains and destroyed wetlands along our coast. This is a striking contrast to the completed works by Landscape Architects, such as the Blue Ridge Parkway and the Biltmore Estate.

- (3) In what ways has the public health, safety, or welfare sustained harm or is in imminent danger of harm because of the lack of state regulation? Please give specific examples.**

The land and other natural resources of North Carolina must be handled by qualified professionals whose education and experience allow them to apply user needs for these resources in a manner that respects our stewardship of these resources. Errors made by the unqualified would have consequences that may last for generations. The Landscape Architect is uniquely trained and educated to mediate our desired use of the land with the natural systems so vital to our good health. Decisions to remove certain trees, excavate in certain areas, or drain storm water in a specific way are all decisions that cannot be undone or corrected later.

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Landscape Architects have done much in the past 28 years to protect North Carolina's resources. Without a mandatory practice act, Landscape Architects cannot prevent much of the abuse of our natural resources that occurs today with poor land planning.

- (4) **Is there potential for substantial harm or danger by the profession or occupation to the public health, safety, or welfare? How can this potential for substantial harm or danger be recognized?**

Yes. The potential for permanent damage to our land and other natural resources by an incompetent or unprofessional individual is great. To see one of North Carolina's majestic mountain tops graded flat, or to see a delicate coastal ecosystem destroyed by crude and insensitive design are examples enough to recognize the harm caused by unqualified land planning and design services.

- (5) **Has this potential harm or danger to the public been recognized by other states or the federal government through the licensing or certification process? Please list the other states and any applicable federal law (including citations).**

Yes. At this time, 45 states have licensure for landscape architects. Of the 45, 25 have practice statutes and 20 have title only statutes. The states which license landscape architects are: Alabama, Arizona, Arkansas, California, Connecticut, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, Washington, West Virginia, Wisconsin, and Wyoming. The Federal government includes landscape architecture in the new North American Industrial Classification System Codes (formally S.I.C.) used for procuring consulting services by the government. In addition, several provinces of Canada now subscribe to the same national Landscape Architect's Registration Exam as is used by North Carolina and the other states with licensure. China and Australia are currently seeking assistance on establishing a landscape architect licensure system in their jurisdictions.

- (6) **What will be the economic advantage of licensing to the public?**

The preservation of limited natural resources has economic benefit to all land owners and the general public. Most often, proper landscape architectural design services save direct costs of construction because of

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the manner in which landscape architects design to "fit the land". There are direct economic benefits from any competent advice and good design that leads to increases in the value of your real estate.

**(7) What will be the economic disadvantage of licensing to the public?**

Highly competent and experienced individuals who have pursued the necessary education and training to become a qualified professional most often increase their market value. Landscape architects are currently valued by the development community at a rate comparable to Architects and Engineers. This cost for quality professional services is passed on to the end user and consumer.

**(8) What will be the economic advantages of licensing to the practitioners?**

Licensure qualifies the practitioner for state and federal contracts in the design services arena. Without licensure, Federal projects in North Carolina may have to be done by out of state Landscape Architects who have licensure. Those who pursue the education and experience requirements will also see their personal market value increase.

**(9) What will be the economic disadvantages of licensing to the practitioners?**

The necessary education and subsequent examination costs are direct expenses to any candidate for licensure. Continuing education requirements for continued competence in the profession have direct costs to the practitioner.

**(10) Please give other potential benefits to the public of licensing that outweigh the potential harmful effects of licensure such as a decrease in the availability of practitioners and higher cost to the public.**

The practice of landscape architecture affects not only the specific client who interacts with the landscape architect but also the public who uses the facility and the environment in and around the facility. Licensure not only protects the client, the end users, and the environment by ensuring the competency of practitioners, but it also creates legal professional liability and responsibility. This liability and responsibility is personal to the professional and cannot be transferred to a corporation or other entity. It also extends beyond contractual responsibilities. This means that a licensed professional must always act in a manner which protects the health and welfare of the public. Such legal professional liability

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does not occur outside of licensure.

In addition, in the case of landscape architecture, licensure actually increases the number of professionals available to provide services to the public. Licensed landscape architectural services primarily involve the preparation of documents for the development of land and/or the construction of facilities. Prior to issuing a development or building permit, virtually all jurisdictions require submission of technical documents containing the seal of the responsible licensed professional. Through licensure, landscape architects are able to produce or seal such construction documents which thereby allows the public to employ landscape architects to provide these services. Without licensure, the public would have no choice other than to hire other professionals, such as engineers or architects, who may be less able than landscape architects in site and environmental design and who are often more expensive to employ. Obviously, the more competent registrants available to the public the greater the competition.

**(11) Please detail the specific specialized skills or training that distinguish the occupation or profession from ordinary labor.**

The licensing process for the profession of landscape architecture relies on three elements: education, examination, and experience.

**Education:** The applicant must be a graduate of a Landscape Architectural Accreditation Board (LAAB) approved curriculum. LAAB is recognized by the Commission on Recognition of Post secondary Accreditation (COPRA) as the accrediting agency for first-professional baccalaureate and master's degree programs in landscape architecture. LAAB accreditation evaluates each program on the basis of its stated objectives and compliance to mandated minimum standards. The normal baccalaureate degree program lasts between four (4) and five (5) years and includes a rigorous course of study focused around design studios. In design studios, students apply technical knowledge in solving real world problems through the design process. Currently there are 73 LAAB accredited programs in the United States. There are three LAAB accredited programs in North Carolina.

**Examination:** The second leg of competency assurance is based on the passage of a written exam. For landscape architects this test is the Landscape Architect Registration Examination (LARE). The LARE is developed and administered by the Council of Landscape Architectural Registration Boards (CLARB). CLARB is comprised of the licensing boards from the 45 US States and 2 Canadian Provinces which license landscape architects. The LARE is the most rigorously proven examination used by any of the major design professions. According to an independent audit conducted by the Educational Testing Service, the largest and most respected testing consultant in the world, the LARE

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meets or exceeds virtually all nationally recognized testing standards. The content of the LARE is based on the results of a thorough Job/Task Analysis, which determines what tasks landscape architects use as part of their normal practice, and the knowledge, skills and abilities (KSAs) required to accomplish those tasks in a manner that protects public safety. Psychometricians then use a factor analysis to determine the best method for testing the KSAs. In the LARE, performance problems requiring design and technical solutions are included for the candidate to solve, and only two of the six sections of the exam are multiple choice format. The result is an exam which tests those KSAs which have the most impact on public safety, using the most appropriate testing methodologies. In addition to passing the ETS audit and regular reviews, the LARE has been successfully defended against legal challenges. The scientific study (task analysis) of the profession of landscape architecture identified the knowledge, skill and abilities required to provide those landscape architectural services which affect the health, safety and welfare of the public. The complete list of specific skills (KSAs) identified are attached to this response, however they can be summarized as follows: Knowledge of regulations, contracts, construction administration processes, inventory and analysis, construction processes and supporting systems, materials and methods of construction, and construction documents. Ability in the areas of written communication, conceptual design, schematic design, design development, detail design and materials and methods of construction, grading and drainage.

Experience: CLARB statistical studies of the performance of past LARE candidates have shown that a minimum of 3 to 4 years of practical experience after a degree is necessary to master the skills needed to be a landscape architect and pass the exam. This experience must be a progressive series of learning activities under the scrutiny of a seasoned veteran practitioner.

- (12) What are other qualities of the profession or occupation that distinguish it from ordinary labor?**

Landscape architecture affects large areas of land for generations. The impact of their services extend beyond the individuals with whom the landscape architect establishes a contractual relationship and includes the end users of the facility and the environment. This is a professional responsibility that is different from ordinary labor.

- (13) Will licensing requirements cover all practicing members of the occupation or profession? If any practitioners will be exempt, what is the rationale for the exemption?**

Licensure will cover all aspects of the profession of landscape architecture and all practitioners. It will not affect other related

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professions already being regulated, such as architecture, engineering, and land surveying. Other exclusions in the existing law allow nurserymen and others to continue to do activities that do not affect the health, safety or welfare of the public.

- (14) What is the approximate number of persons who be regulated and the number of persons who are likely to utilize the services of the occupation or profession?**

There are currently 356 licensed landscape architects who are residents of North Carolina. An additional 147 licensees reside out of state and provide services in North Carolina. Since landscape architects provide design services for schools, parks, subdivisions, recreational facilities, apartment complexes, government planning departments, and commercial centers, there is probably not a single North Carolina citizen who has not used a facility designed by a landscape architect or been affected by decisions made by Landscape Architects.

- (15) What kind of knowledge or experience does the public need to evaluate the services offered by the practitioner?**

Members of the general public are unable to evaluate the quality of services being provided by the landscape architect. Specialized knowledge of the analysis, design and construction of public and private facilities is required to adequately determine level of services required. Licensure is needed to make sure the public is receiving the services they need to solve their land use problems in today's complex regulatory systems.

- (16) Does the occupational group have an established code of ethics, a voluntary certification program, or other measures to ensure a minimum quality of service?**

No. The American Society of Landscape Architects (ASLA) has a code of professional ethics for its members, but membership in the society does not regulate the offering of landscape architectural services or the use of the title "Landscape Architect". The existing North Carolina Board of Landscape Architects does have a code of professional conduct within its rules, along with definitions of dishonest practice, unprofessional conduct, and incompetence. This existing Board has taken disciplinary action in the past against licensees guilty of infractions, but it is very limited in its punitive powers under the current statute.

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## Knowledge, Skills and Abilities Required of Landscape Architects

### Section 1.1 — Regulations

- Knowledge of development restrictions and their sources, such as zoning, codes, etc.
  - Documents that restrict various aspects of a development and its uses
- Knowledge of government policies that affect the use and/or development of land
  - Environmental regulations that affect land use development
- Knowledge of basic construction law
  - Different types of liens and their purposes
  - Owner and landscape architect liabilities
  - Various bond types posted prior to construction of a project
- Knowledge of planning and land use law
  - Laws and government agencies that establish planning policies for a community

### Section 1.2 — Contracts (22%)

- Knowledge of professional service and construction contracts; their organization and the responsibilities of the various parties under the construction contract
  - Responsibilities of the landscape architect, the owner and the contractor
  - The proper role of the parties involved in a construction contract when a conflict arises
- Knowledge of insurance and bonding principles related to professional services and construction
  - Professional liability insurance
  - Worker's compensation insurance
- Ability to interpret contract documents and evaluate construction for conformance
- Knowledge of appropriate level of information to provide a consultant team, including management and administration of the design team
  - The responsibilities of each member of a design team
  - Information that should be included in a contract when entering into a joint venture on a project

### Section 1.3 — Construction Administration Processes (48%)

- Knowledge of legal procedures for change orders
  - The purpose of a change order and the proper legal steps to submit a change order
- Knowledge of sequencing of design, approval, permitting and construction activities
  - The construction process and the responsibility of different parties for obtaining necessary permits for a project
- Knowledge of legal aspects of the bidding and bid evaluation process, including alternates,

unit prices, bidder qualifications, bonds, etc.

- Knowledge of specification types, such as material, workmanship, performance
  - The general specification sections and what type of information would be located in each section
- Ability to evaluate construction progress for payment requests
  - Assessing the condition of a project and recommending payment be made to the contractor
  - The procedures to authorize payment at any point in a project's completion

Section 2.1 — Inventory (19%)

- Knowledge of base mapping information and its sources, such as existing documentation, land surveys, land use plans, aerial surveys, zoning
  - Locating information on various resources such as maps, surveys and photographs, and understanding their respective symbols
  - Obtaining information relative to land-use and planning
- Knowledge of sources of information on specific site uses, such as sports fields, amphitheater seating, picnic areas, loading docks, etc.
  - Resources for obtaining information on site specific uses, such as government agencies, associations and graphic standards
- Knowledge of hydrology
  - Watershed areas and computing water discharge for a given area
  - Stream characteristics relating to water flow
- Knowledge of geology
  - The determinants for soil genesis
- Knowledge of wildlife habitats and plant associations
- Knowledge of water management
  - Characteristics of storm water runoff and practices used to control or eliminate storm water discharge from a development site
  - Existing watershed systems and how to protect them
- Knowledge of micro and macro climatic conditions and systems (wind, rain, sun orientation)
  - Identifying micro and macro climatic conditions that affect human comfort and location of elements on a site
- Knowledge of soil
  - The makeup and properties of various soil types
  - Soil structure and most desirable types for construction
- Knowledge of surveying practices
  - Appropriate survey practices and terms including bench mark, point of beginning, bearing, baseline, traverse point, etc.

## Section 2.2 — Analysis (20%)

- Knowledge of sociological influence on design
- Knowledge of behavioral factors relating to site design including program needs and evaluation
  - Identifying human behavioral factors that affect site design
  - Design elements and theory that serve to direct human behavior
- Knowledge of mathematics (statistics, reading charts, demographic data, F.A.R., % lot coverage)
- Knowledge of how previous, existing or potential uses surrounding a site affect land use and development
  - How environmental factors, views, noise, zoning, access, etc., surrounding a site affect potential land use and development
- Knowledge of visual analysis methods and techniques
- Knowledge of hydraulics, irrigation types and systems, and their design requirements
  - Basic principles of irrigation design
- Knowledge of elements of circulation systems (such as turning radius, walk widths, clearances, slopes, etc.) and their design requirements
  - Correct standards for size, layout, intersection distance, setbacks, etc.
  - Purpose for establishing minimum standards for circulation systems
  - The influence of transportation systems on land use and development
- Ability to read and interpret drawings, maps, aerial photos and related symbols
  - Standard symbols used on drawings, maps, aerial photos, etc.
  - Features distinguished on a particular resource and why one resource would be superior to another for obtaining information
- Ability to assess condition of built elements such as buildings, roads, walks, etc.
  - Recognizing and understanding the cause of existing problems associated with construction

## Section 2.3 — Construction Processes and Supporting Systems (34%)

- Knowledge of mitigating techniques in engineering such as noise, wetlands and impacts on natural environments
  - Methods to mitigate effects of the construction process
- Knowledge of littoral effects on design and construction
  - Effects of the seashore and surrounding region on design and construction
- Knowledge of utility systems and their design requirements (closed drainage systems)
  - Calculating storm water run-off volumes given certain site conditions
  - Utility systems and their installations

- Knowledge of code requirements and design principles for universal accessibility
  - Accepted standards for slopes, dimensions, etc. for universal accessibility
- Knowledge of materials and techniques to stabilize soils and control sedimentation
- Knowledge of structural considerations below grade, such as soil bearing, footing foundation systems, etc.
- Knowledge of structural considerations above grade, such as reinforcing, hand rails, spans, decking, slabs on grade, retaining walls, etc.
- Knowledge of construction equipment
- Knowledge of quality control procedures for construction, such as delivery, storage, testing, etc.
- Knowledge of land and water reclamation procedures, such as wetland creation, quarry, mines and landfill reclamation, etc.
- Knowledge of landscape maintenance techniques, materials, equipment and practices
- Ability to estimate costs and quantities
  - Determining the cost of materials and construction methods
  - Estimating quantities of materials for a construction project
- Ability to estimate the development time frame, including the design, approval and construction periods
- Ability to coordinate specifications and consultant's drawings with each other and with contract documents
- Ability to evaluate the quality of plant materials

Section 2.4 — Materials and Methods of Construction (18%)

- Knowledge of plant types and applications
  - Plant materials with desirable aesthetic characteristics
- Knowledge of plant materials to include hardiness, moisture requirements, soil requirements, etc.
  - Plant materials which fulfill hardiness requirements for a particular climate
- Knowledge of factors influencing selection of plant materials, such as availability, cost, maintenance, location, survivability, dependability, etc.
- Knowledge of elements of lighting systems, including light sources and their design properties
  - Recommended light types and intensity for particular situations

- Knowledge of elements of miscellaneous site improvements (pools, fountains, walls, site furniture, play equipment, signs, etc.) and their design implications
- Knowledge of installation techniques of construction materials
- Knowledge of typical construction details and material assemblies, including fasteners, finishes, etc.
- Knowledge of site construction materials, including availability, costs, basic characteristics and applications

Section 2.5 -- Construction Documents (9%)

- Knowledge of coordinate systems and layout techniques and conventions
- Knowledge of common graphic symbols
  - Standard graphic symbols used in the construction document package
- Knowledge of components of specifications for a project including preparation
- Ability to determine appropriate scale, level of detail and organization of information for contract drawings

Section 3.1 — Written Communication (21%)

- Ability to communicate in written form
  - Conveying information and/or expressing ideas in a written format using proper organization and grammar
- Ability to prepare and communicate information in a manner understandable to the recipient(s)
  - Conveying design ideas in written form clearly and effectively

Section 3.2 - Conceptual Design (79%)

- Knowledge of topography
  - Organizing elements to fit the topographic characteristics of a site
- Knowledge of the influence of internal and external views on land use/development
  - Relationships of design elements based on internal and external views from a site
  - Organizing elements to enhance or filter internal and external views
- Knowledge of functions of program elements and desired relationships among elements
  - Organizing program elements into an appropriate concept given design guidelines
  - Design relationships given certain uses and contextual information
- Ability to organize and synthesize data
  - Developing concepts and organizational structures from a given program
  - Interpreting site analysis data and making proper decisions based on this information
- Ability to translate a program into a relationship diagram

- Ability to evaluate the capability of a site to support program requirements
- Ability to distinguish the primary components that comprise the design concepts
  - Evaluating a design and recognizing the relationships that exist between the elements
- Ability to create alternate solutions to a problem
- Ability to communicate graphically
- Ability to identify and select best alternatives from multiple solutions

#### Section 4.1 — Schematic Design (57%)

- Knowledge and ability to implement basic design principles
  - Application of the organizing concepts and methods of design elements
- Knowledge of roadway alignment design principles
  - Road layout concepts and principles
  - Properly fitting roads into existing site conditions such as topography, vegetation, soils, etc.
- Knowledge of design requirements of elements of plant types
  - Using plant materials to fulfill fundamental functional uses (define space, affect microclimate, engineering uses, and aesthetic uses) for major plant types such as trees, shrubs and ground covers
- Ability to organize and synthesize data
  - Collecting all information together in a logical organization
  - Developing concepts and organizational structures from a given program
  - Interpretation of site analysis data as a basis for decision-making
- Ability to organize elements to scale on the site
  - Organizing (not drawing) elements to scale on a site
  - Developing correct proportional scale relationships appropriate to the concept and use of a design
- Ability to organize elements with the consideration of 3-dimensional spatial relationships
  - Developing spatial compositions based on the knowledge of scale, proportion, enclosure, etc.
  - Formulating single spaces and sequence of spaces
  - Relationship between hard and soft elements
- Ability to translate design concepts into physical form
  - Developing a 3-dimensional design form from a given written or graphic concept
  - Developing a physical design form from given design guidelines

- Ability to design and implement circulation systems to meet requirements
  - Designing vehicular systems (roads and parking) including access and service requirements
  - Designing pedestrian systems
  - Designing combination systems
  - Correct standards for size, layout, intersection distances, setbacks, etc.
- Ability to interpret, visualize and manipulate landforms through contours and spot elevations
  - Using landform as a design element (as opposed to a technical element)
  - Fitting program elements into existing site topography
  - Moving or regrading landform on a site to meet program requirements
- Ability to communicate graphically
  - Communicating in all potential graphic views including plan, section and elevation

Section 4.2 — Design Development (43%)

- Knowledge of design requirements of elements of plant types
  - Using and identifying plant materials according to their characteristics of size, form, color and texture at the scale of design development (does NOT include identifying plant species)
- Knowledge of characteristics (such as size, shape, texture, color, etc.) of classes of site elements
  - Selecting and composing materials appropriate to the program requirements, design theme, site characteristics, etc.
  - Proper interconnections among different elements and materials
- Knowledge of code requirements and design principles for universal accessibility
  - Designing for proper accessibility in terms of handicap, fire, safety, etc.
  - Designing access elements that are properly integrated into design ( not "add-ons")
  - Selecting materials (hard and soft) for proper durability and safety
- Knowledge of landscape maintenance techniques, materials, equipment and practices
  - Designing elements with regard to maintenance techniques
  - Landscape maintenance materials and equipment that could affect potential design forms and elements
- Ability to design and implement plantings to meet requirements
  - Proper use of plant materials based on fundamental functional uses (define space, affect microclimate, engineering uses, and aesthetic uses)
- Ability to design and implement site lighting systems to meet requirements
  - Selecting and locating generic lighting types for public safety and welfare
- Ability to design and implement miscellaneous site improvements (pools, fountains, walls, site furniture, play equipment, signs) to meet requirements
  - Selecting and locating miscellaneous site improvements for public safety and welfare

**Section 5.1 — Detail Design and Materials and Methods of Construction (100%)**

- Ability to design and implement miscellaneous site improvements (pools, fountains, walls, site furniture, play equipment, signs, etc.) to meet requirements
  - Detail (in a design development manner) of site improvements relating to physiological and aesthetic stimuli
  - Implementation of design intent through design development details
- Knowledge of methods of installation of construction materials
  - Construction sequencing
  - Construction material installation techniques
- Knowledge of typical construction details and material assemblies, including fasteners, finishes, etc.
  - Connecting materials using standard construction practices in an economical and safe manner
  - Developing a design development detail using specified materials and finishes
- Knowledge of site construction materials, including availability, costs, basic characteristics and applications
  - Designing with cost effective materials
  - Material characteristics and applications to protect public safety and welfare
  - Material characteristics and applications to meet existing site and physiological factors

**Section 6.1 — Grading (63%)**

- Knowledge of mathematics
  - Calculating slopes, grades and volumes of material
- Knowledge of elements of grading and drainage and their design requirements
  - Grading principles and techniques to accommodate design improvements and facilitate the removal of storm water
- Knowledge of code requirements and design principles for universal accessibility
  - Grading circulation systems for proper accessibility in terms of handicap, fire, safety, etc.
  - Codes that establish maximum slopes for universal accessibility
- Ability to translate design concepts into physical form
  - Manipulating contours to achieve design intent in a 3-dimensional aspect
  - Manipulating landforms for use as a design element
- Ability to design and implement grading and drainage to meet requirements
  - Changing the elevations of the existing landscape to accommodate structures, parking and circulation, and to facilitate the removal of storm water

- Ability to interpret, visualize and manipulate landforms through contours and spot elevations
  - Moving or regrading landform on a site to meet program requirements

Section 6.2 — Drainage (37%)

- Ability to design surface and subsurface storm drainage systems
  - Hydraulic characteristics of storm drainage systems
  - Storm drain connections and requirements
  - Design of storm drainage systems to effectively and safely remove storm water from a site

